

Installation Guide

Controller Series E1000/E2000/E4000



Products

- E1000-AT / -MT /-DN /-CO
- E2000-AT / -MT /-DN/-CO
- E4000-AT / -MT /-DN/-CO

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Important notes for E1000/E2000/E4000 series controllers**CAUTION !!**

In order to assure a safe and error free operation, and to avoid severe damage to system components, all system components must be directly attached to a single ground bus that is earth or utility grounded.



Each system component should be tied directly to the ground bus (star pattern), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot controllers.)



All connectors must not be connected or disconnected while DC voltage is present. Do not disconnect system components until all LinMot controller LED's have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage been disconnected). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.



Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply.



Do not connect or disconnect the motors from controllers with voltage present. Wait to connect or disconnect motors until all LinMot controller LED's have turned off. (Capacitors may not fully discharge for several minutes after power has been turned off). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.

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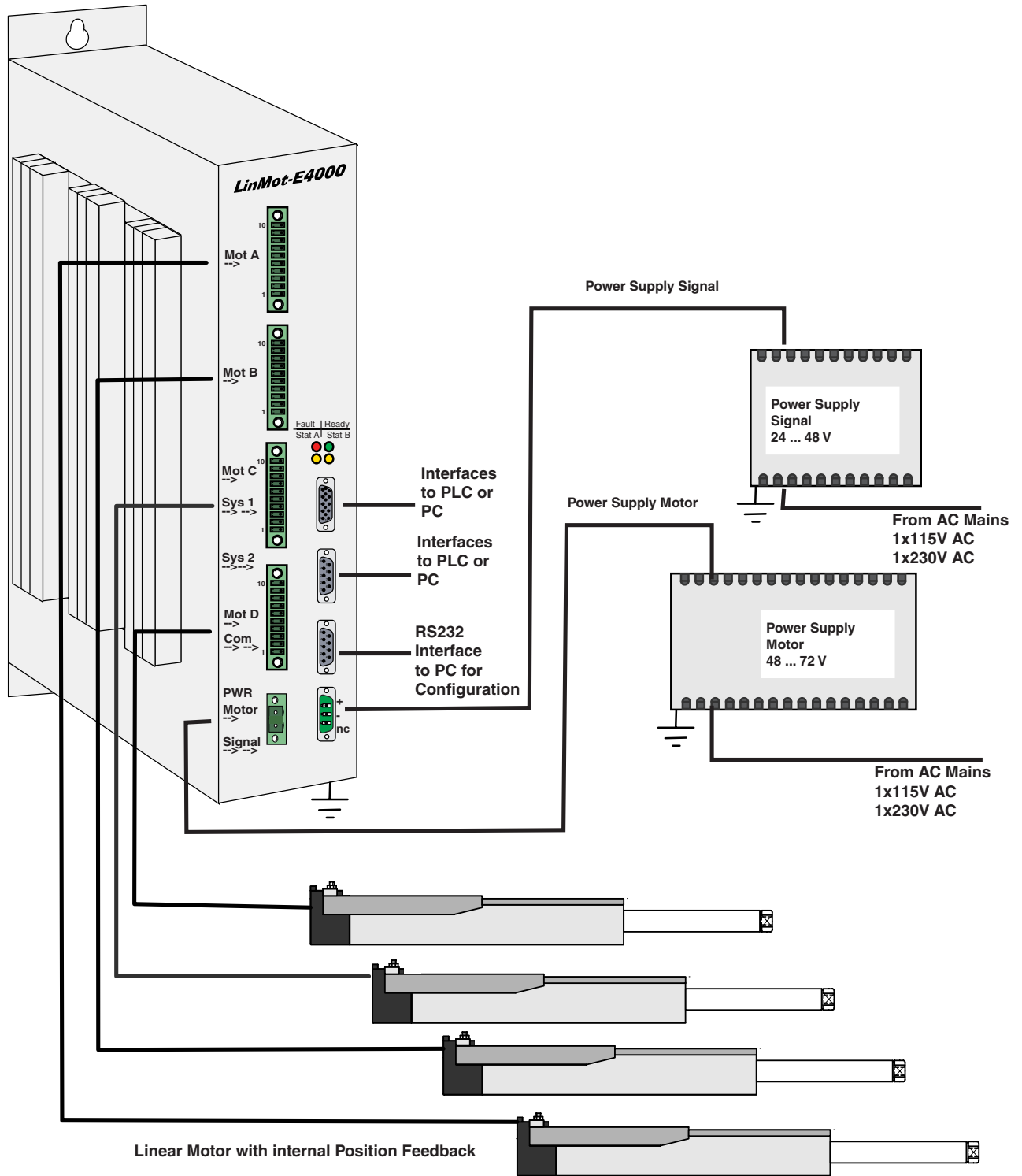
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Note

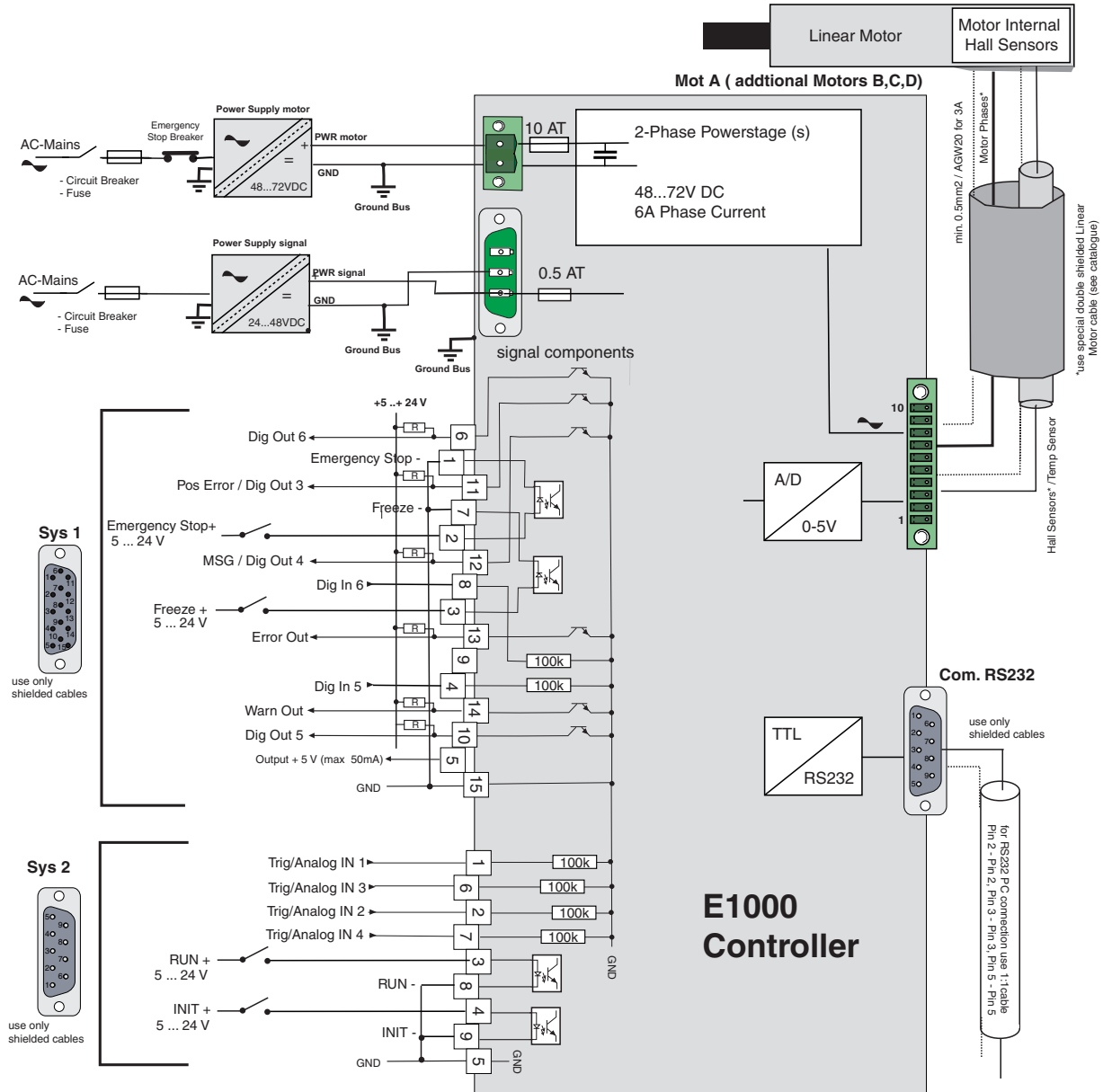
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System Overview



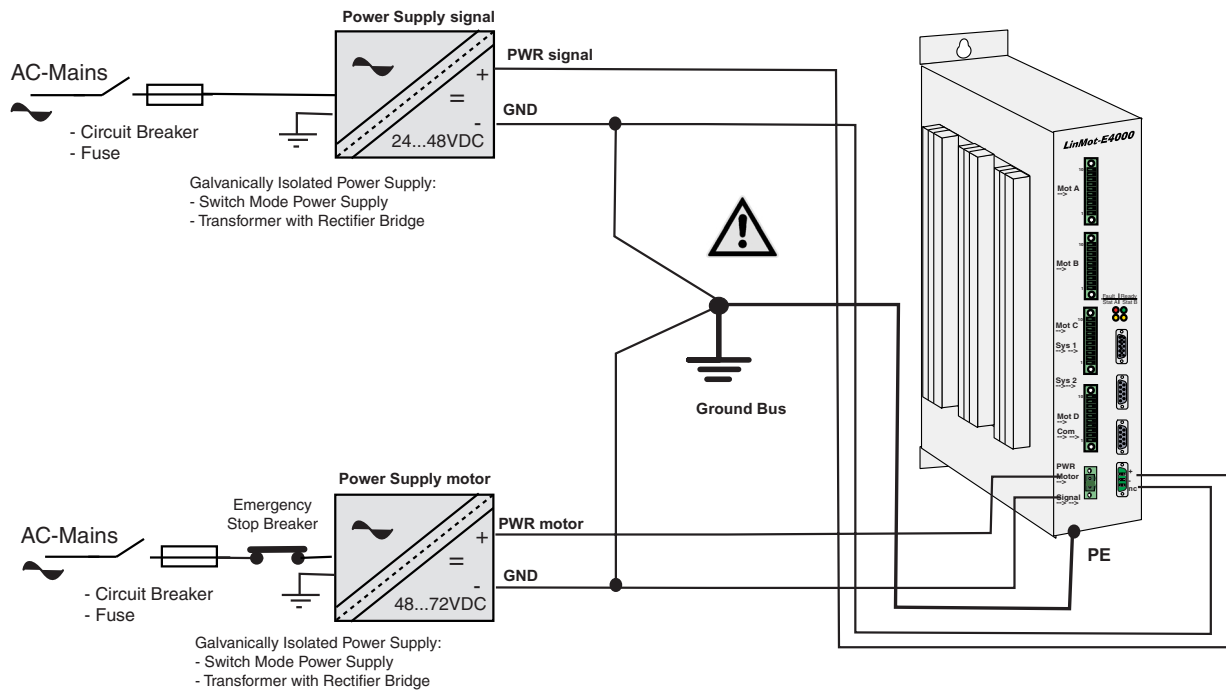
Complete E4000 Controller based system (E1000 and E2000 controllers will only drive one respectively two motors). Power Supply for Signal and Motor may be the same device (see later).

E1000 series Function and Wiring



Typical wiring of a single axes controller. Multiple axes controller will have additional motor connectors.

Power Supply and Grounding



Instead of two separated power supplies it may be possible to use only one power supply of 48V if there is no need to control the signal power supply (logical devices of the controller) and the power supply of the powerstage for the motors independently (see safety rules of the application).



In order to assure a safe and error free operation, and to avoid severe damage to system components, **all system components must be well grounded to either a single earth or utility ground.** This includes both LinMot and all other control system components to the same ground bus.



Each system component should be tied directly to the ground bus (**star pattern**), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot controllers.)



Power supply connectors must not be connected or disconnected while DC voltage is present. Do not disconnect system components until all LinMot controller LED's have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage been disconnected). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.



Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply. Failure to observe these precautions may result in severe damage to controller.

Description of the connectors / Interfaces

Power Supply	
<p>Power Connector Motor</p> <p>Power Connector Signal</p>	

Power Supply Motor:

Wiring: 2.5 mm² (AWG12), max length 5 m
 Supply Voltage 48...72 VDC. Absolute max. Rating 72VDC + 5%
 Supply voltage for PWR Signal and PWR Motor may be different
 Motor Supply GND must be externally connected to earth

Power Supply Signal:

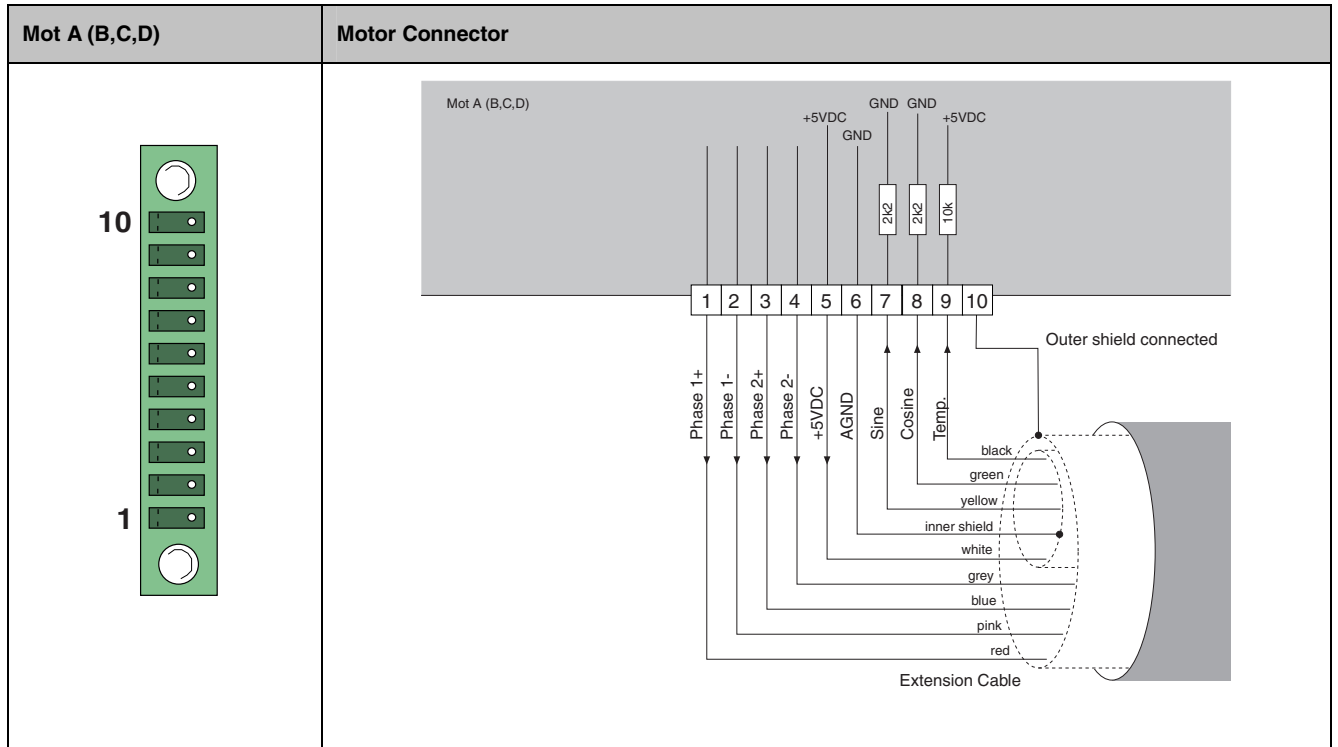
Wiring: 1.5 mm² (AWG16), max length 5 m
 Supply Voltage 24...48VDC. Absolute max. Rating 48VDC + 10%
 Supply voltage for PWR Signal and PWR Motor may be different
 Motor Supply GND must be externally connected to earth



Caution:

By exceeding 53VDC Power Supply Signal, the controller will go into error state, voltage higher than 55 VDC will damage the controller!
 By exceeding 76 VDC Motor Supply Signal, the controller will go into error state, voltage higher than 79 VDC will damage the controller!
 Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supplies
 Power supply connectors must not be connected or disconnected while DC voltage is present.

LED	State Display
	Ready Green READY The system has started correctly
	Stat A Yellow STAT A Coding for the actual operating state Stat B Yellow STAT B Coding for the actual operating state The display of the various operating states is shown on the last page of this manual.
	Fault red FAULT An error has occurred (In the state ERROR a blink code of the STAT LEDs A and B tells what the actual error is. The blink codes are explained in chapter 'Service' of the user Manual.)



Note:

- Use only special double-shielded Linear Motor Cable (see datasheet 'extension cables')
- Use +5V (Pin 3) and AGND (Pin 6) only for motor internal Hall Sensor supply (max. 100mA).
- Do NOT connect AGND (Pin 6) to ground or earth!
- Inner shield (AGND) and outer shield (earth) must be isolated to each other.

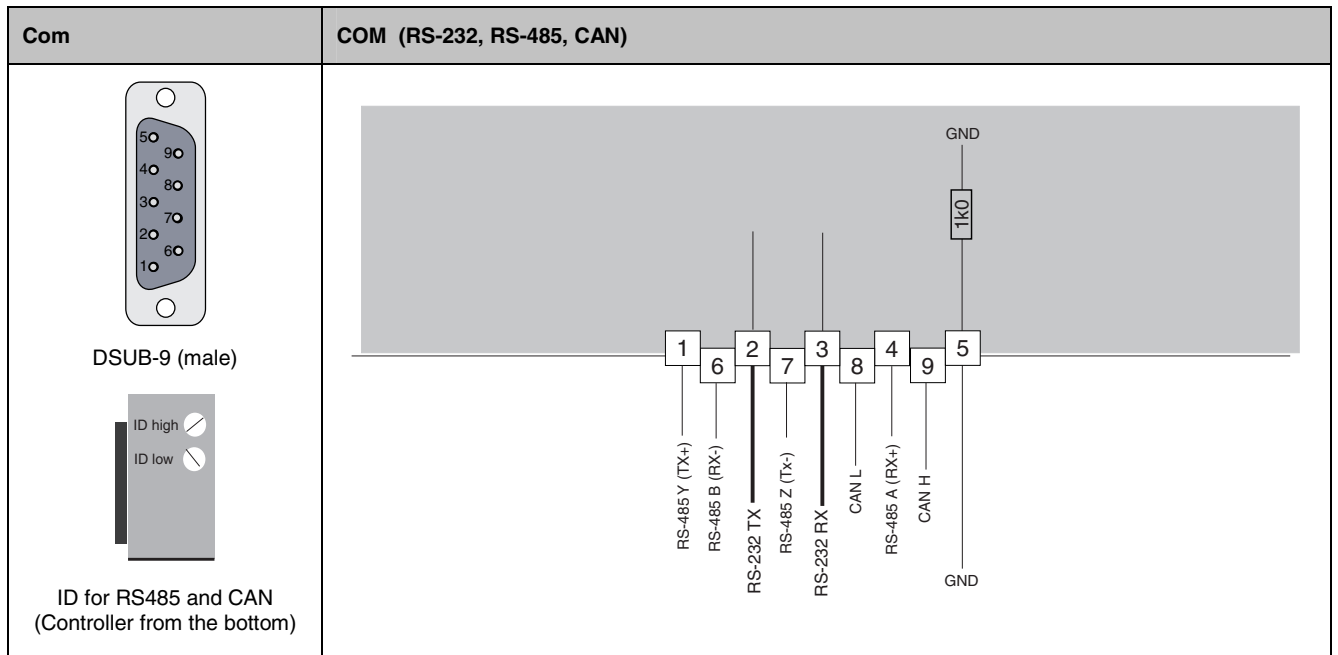


Caution:

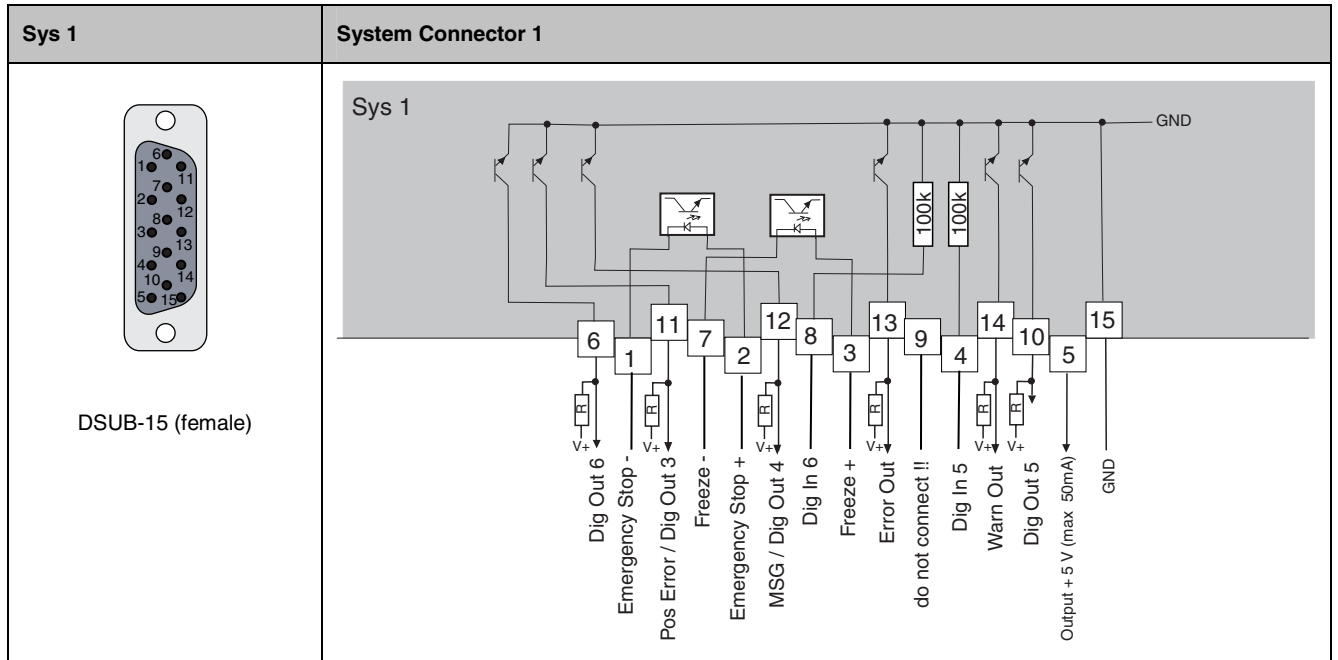
- Wrong Motor wiring may damage Linear Motors and/or Servo Controller.
- If you are assembling motor cables by your own, double check motor wiring carefully before power up.



Do not connect or disconnect the motors from controllers with voltage present. Wait to connect or disconnect motors until all LinMot controller LED's have turned off. (Capacitors may not fully discharge for several minutes after power has been turned off). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers. Depending on the environment the outer shield of the motor cable should be directly connected to the control cabinet where the controller is built in to get the best emc results.



RS232: 9.6kBaud, use 1:1 connection cable to PC
RS485 and CAN needs external termination (see manual)



Emergency Stop (active low) / Freeze input (active high)

Optical isolated inputs
 Input voltage: 0 24V
 for logical zero < 2V
 for logical one > 3.5V
 Input current: < 20 mA (internally limited to 20 mA)
 Update rate: 1.6 ms

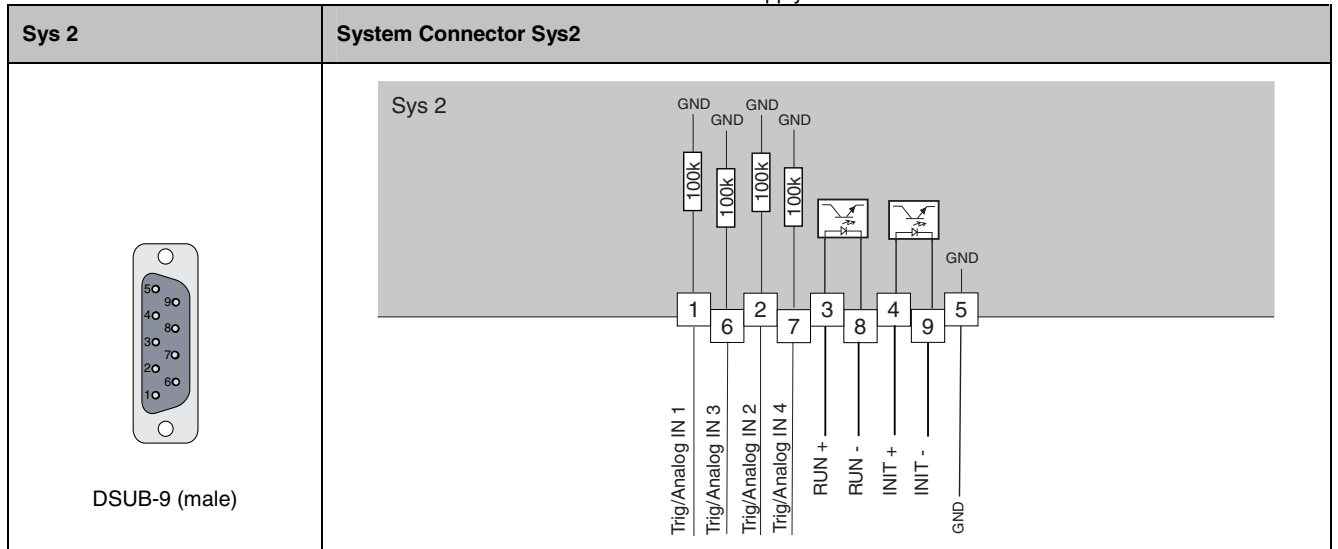
Dig In 5 / Dig In 6

max. 24V, _input resistance 100kOhm for logical zero < 2V for logical one > 3.5V

Dig Outputs: Dig Out 6, Pos Error Out, MSG, Error Out, Warn Out, Dig Out 5

Open Collector max 24V / 50 mA)

Typical pull-up Resistor R: for V+ = 5V supply: R= 150 Ohm / 0.25 W
 For V+ = 24V supply: R=820 Ohm / 1W



Trig/Analog IN

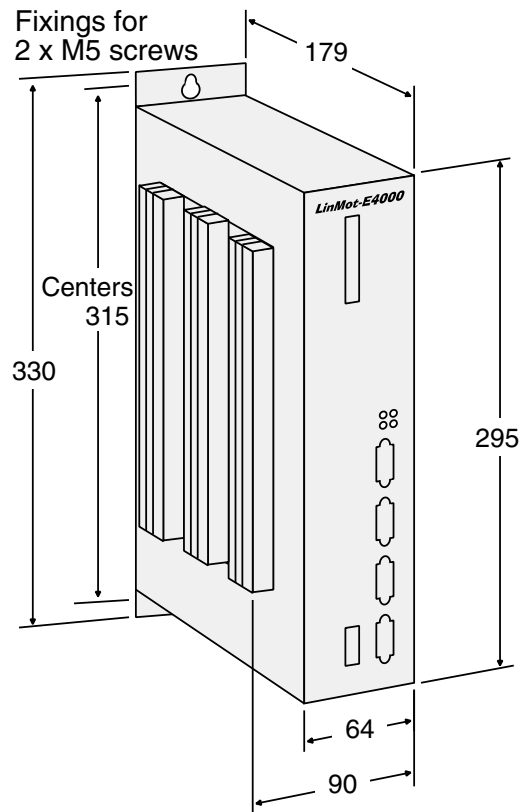
Input can be used as analog inputs between 0 ... 10V (10 bit resolution) input resistance 100kOhm or digital inputs (max. 24V, _input resistance 100kOhm) for logical zero < 2V for logical one > 3.5V

RUN (active high) / INIT (active high)

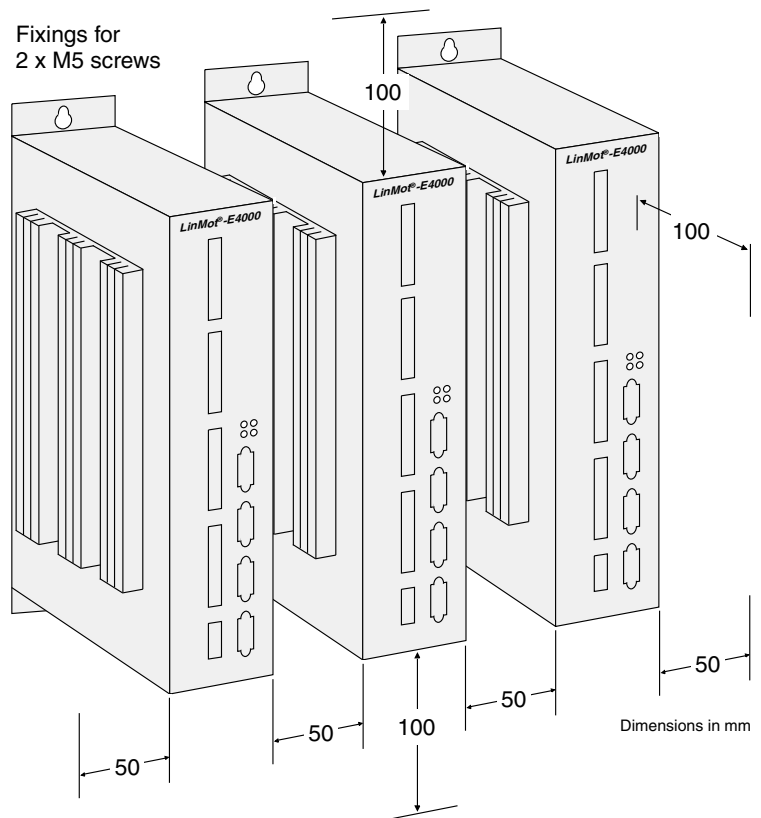
Optical isolated inputs
 Input voltage: 0 24V
 for logical zero < 2V
 for logical one > 3.5V
 Input current: < 20 mA (internally limited to 20 mA)
 Update rate: 1.6 ms

Mechanical Dimension

Dimensions



Recommended mounting for multiple controller installation



		E1000 <i>Single axes controller</i>	E2000 <i>2 axes controller</i>	E4000 <i>4 axes controller</i>
Width	mm (in)	90 (3.5)		
Height	mm (in)	330 (13)		
Height without fixings	mm (in)	295 (11.9)		
Depth	mm (in)	176 (7)		
Weight	Kg (lb)	2.5 (5.5)	2.6 (5.7)	2.7 (5.9)
Case	IP	40		
Storage Temperature	°C	-25...70		
Operating Temperature	°C	0...50		
Max. Case Temperature	°C	65		

Power Supply Requirement

Power Supply motor

The calculation of the needed power for the Motor supply is depending on the application and the used motor(s). The following table shows a recommendation for general applications.

Controller		Voltage/ Power	LinMot Switched- Power Supply	Part-Nr.
E1000	1 motor	72 V / 300 W	S01-72/300	0150-1942
E2000	Up to 2 motors	72 V / 600 W	S01-72/600	0150-1943
E4000	Up to 4 motors	72 V / 600 W	S01-72/600	0150-1943

Power Supply signal

24 ... 48 V / 10 W

Regeneration of Power

The Exxxx controller don't use a regeneration resistor. In most application the recuperated energy will not become an issue. In cases where the motor power supply voltage will exceeds the voltage limits because of recuperation an additional capacitor between 'PWR motor' and 'GND' should be used. Typical: 22'000 uF.

Ordering Information

Servo Controller	Description	Art. No.
E1000-AT	Analog Trigger Controller 1 Axis (72V/6A)	0150-1605
E1000-MT	Multi Trigger Controller 1 Axis (72V/6A)	0150-1615
E1000-DN	DeviceNet Controller 1 Axis (72V/6A)	0150-1645
E1000-CO	CanOpen Controller 1 Axis (72V/6A))	0150-1673
E2000-AT	Analog Trigger Controller 2 Axis (72V/6A)	0150-1606
E2000-MT	Multi Trigger Controller 2 Axis (72V/6A)	0150-1616
E2000-DN	DeviceNet Controller 2 Axis (72V/6A))	0150-1646
E2000-CO	CanOpen Controller 2 Axis (72V/6A))	0150-1674
E4000-AT	Analog Trigger Controller 4 Axis (72V/6A)	0150-1608
E4000-MT	Multi Trigger Controller 4 Axis (72V/6A)	0150-1618
E4000-DN	DeviceNet Controller 4 Axis (72V/6A)	0150-1648
E4000-CO	CanOpen Controller 4 Axis (72V/6A)	0150-1676

Declaration of Conformity CE-Marking

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Products: LinMot® Controllers

Type	Art.-No.	Type	Art.-No.	Type	Art.-No.
E1000-AT	0150-1605	E1000-MT	0150-1615		
E2000-AT	0150-1606	E2000-MT	0150-1616		
E4000-AT	0150-1608	E4000-MT	0150-1618		
E1000-DN	0150-1645	E1000-CO	0150-1673		
E2000-DN	0150-1646	E2000-CO	0150-1674		
E4000-DN	0150-1648	E4000-CO	0150-1676		

The product must be mounted and used in strict accordance with the installation instruction contained within the User's Manual, a copy of which may be obtained from NTI Ltd.

I declare that as the authorized representative, the above information in relation to the supply/manufacture of this product is in conformity with the stated standards and other related documents in compliance with the protection requirements of the EMC Directive (89/336/EEC) and is marked in accordance with the CE Marking Directive (93/68/EEC).

Standards Complied with:

EMI	EN 55011	Class A
EN 61000-6-4		
Electromagnetic	EN 61000-4-2	4 kV / 8kV
Susceptibility EMC	EN 61000-4-4	1 kV / 2kV
EN 61000-6-2	EN 61000-4-3	10 V/m
	EN 61000-4-6	10 V
	ENV 50204	10 V/m

Company
 NTI Ltd.

Zürich, February 24, 2003

 R. Rohner / CEO NTI Ltd.

Error codes

Error display When an error occurs it is displayed by means of the blinking of at least one of the four LEDs on the front of the servo controller.

Ready LED The Ready LED is ON as soon as the supply voltage for the processor is guaranteed and the system has started up correctly. Communication with the PC over the serial interface is only possible when this LED is ON.

The following table summarizes the blink codes and their meaning:

LED			Description	
Fault	Stat A	Stat B		
1 ~ 3Hz	off	off	HW system error: Hardware error in the servo controller.	
2x 1 ~ 1Hz			SW1 System error: Software error in the servo controller. The system software wasn't loaded successfully.	
1 ~ 1Hz			SW2 System error: Software error in the servo controller. The system software wasn't loaded successfully.	
On	1 ~ 2Hz	1 ~ 2Hz	Generic fault: The exact error message may be displayed with the error inspector.	
On	n	2x 1	The supply voltage for the Power circuitry is too low.	
		3x 1	The supply voltage for the Power circuitry is too high.	
		4x 1	The supply voltage for the Signal circuitry is too low.	
		5x 1	The supply voltage for the Signal circuitry is too high.	
		6x 1	The servo controller is too hot.	
			8x 1	Application Software Error (see Manual)
	1x 1 : Mot A	1x 1	The motor is overloaded.	
	2x 1 : Mot B	2x 1	The motor is too hot.	
	3x 1 : Mot C	3x 1	Following error.	
	4x 1 : Mot D	4x 1	The slider is missing from the motor.	
		6x 1	The initialization was not completed successfully.	
		7x 1	Incorrect motor type configured or damaged motor.	
		8x 1	A referenced motion profile for a motor is missing. Selected motion profile not valid for actual drive type.	

on LED is ON
off LED is OFF

1 LED blinks shortly (ca. ¼s)
n LED blinks longer (ca. 1½s)

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